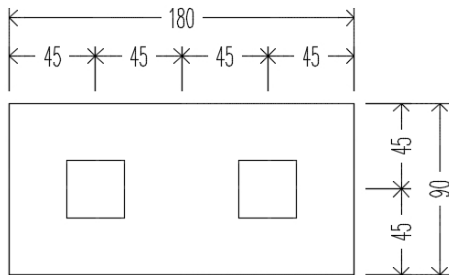


BAB IX

PERHITUNGAN PILE CAP P1

9.1 Penulangan Lentur Pile Cap



Momen pada poer :

Reaksi dari pondasi $P_{max} := 32424 \text{ kg}$ (daya dukung maksimum pondasi)

$$M_u := 0.45 P_{max} \cdot 0.9 = 13131.72 \text{ kgm}$$

Adapun data - data perencanaan untuk penulangan pondasi :

- Tebal pelat : $h := 500 \text{ mm}$
 - Tebal decking $s := 70 \text{ mm}$
 - Diameter tulangan rencana $D16$
 - Mutu tulangan baja $f_y := 390 \text{ Mpa}$
 - Mutu beton $f_c := 20.75 \text{ Mpa}$
- daksen $:= 70 + 16 = 86 \text{ mm}$ $b := 900 \text{ mm}$
- $d := h - \text{daksen} = 414 \text{ mm}$ $\beta := 0.85$

Berdasarkan SNI 2847 pasal 10.4.3 :

$$\rho_{balance} := \frac{0.85 \cdot \beta \cdot f_c \cdot \left(\frac{600}{600 + f_y} \right)}{f_y} = 0.023$$

$$\rho_{max} := 0.75 \cdot \rho_{balance} = 0.017$$

Berdasarkan SNI 03-2847-2002 pasal 9.12.2

$$\rho_{min} := \frac{1.4}{f_y} = 0.004$$

$$m := \frac{f_y}{0.85 \cdot f_c} = 22.112$$

$$M_n := \frac{M_u \cdot 9.81 \cdot 1000}{0.8} = 161027716.5 \text{ Nmm}$$

ambil : $\delta := 0.4$

$$R_n := \frac{(1 - \delta) M_n}{b \cdot d^2} = 0.626 \text{ N/mm}^2$$

$$\rho - \rho_{\text{paksen}} = \frac{\left(1 - \sqrt{1 - \frac{2m \cdot R_n}{f_y}}\right)}{m} = 0.0016$$

$$\rho_{\text{paksen}} := \frac{\delta \cdot M_n}{f_y \cdot (d - d_{\text{aksen}}) \cdot b \cdot d} = 0.0014$$

$$\rho := 0.0016 + 0.0014 = 0.003 \quad \blacksquare < \blacksquare \quad \rho_{\text{min}} = 0.0036$$

$$A_{\text{perlu}} := \rho_{\text{min}} \cdot b \cdot d = 1337.54 \text{ mm}^2$$

Pasang tulangan tarik D16-150

$$A_s := 7 \cdot 0.785 \cdot 16^2 = 1406.72 \text{ mm}^2 \quad \blacksquare > \blacksquare \quad A_{\text{perlu}} = 1337.54 \text{ mm}^2$$

Pasang tulangan lentur D16-150 untuk tulangan tarik & D16-150 untuk tulangan tekan

• **Kontrol Geser Pons**

• **Beban Aksial Kolom**

Perencanaan penampang akibat geser didasarkan pada beban aksial kolom

$$N_{uk} := 499.360 \text{ kN}$$

- Dengan persyaratan $V_u < V_c$ (gaya geser ultimate harus lebih kecil dari kuat geser nominalnya).

$$\text{tebal poer } t_p := 50 \text{ cm}$$

$$\text{dimensi kolom } 50/50$$

$$b_o := 0.5 \cdot t_p + 50 + 0.5 \cdot t_p = 100 \text{ cm}$$

$$d_o := 0.5 \cdot t_p + 50 + 0.5 \cdot t_p = 100 \text{ cm}$$

• **Keliling Kritis**

$$U := 2 \cdot (b_o + d_o) = 400 \text{ cm}$$

• **Luas Kritis**

$$A_k := U \cdot t_p = 20000 \text{ cm}^2$$

• **Kekutan Geser Beton**

$$\beta_c := \frac{50}{50} = 1$$

$$d := t_p - 7 - 1.6 = 41.4 \text{ cm}$$

$$V_c := \left(1 + \frac{2}{\beta_c}\right) \cdot \frac{\sqrt{f_c} \cdot U \cdot d \cdot 100}{6 \cdot 10^3} = 3771.72 \text{ kN} \quad \text{.. SNI 2847 pasal 13.12.2.1}$$

$$\text{Syarat } V_u \leq \phi V_c$$

$$\phi := 0.75$$

$$N_{uk} = 499.36 \text{ kN} \quad \blacksquare < \blacksquare \quad \phi \cdot V_c = 2828.79 \text{ kN} \quad \text{.....OK!!!}$$

